PATENT SPECIFICATION

697,603

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COMPLETE SPECIFICATION

Improvements in or relating to Method of and Devices for obtaining Tissue from a Tumour carried by a Patient

I, SYDNEY ARTHUR GLADSTONE, a citizen of the United States of America, of 137, Graham Avenue, Paterson, New Jersey, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a forceps device for use with a sponge device for obtaining tumor tissue for microscopic examination. Pathologists require such tissue for their determinations of whether tumors are malignant.

Heretofore, it has been usual to excise a specimen from the tumor. This is very painful for the patient and in many instances is extremely dangerous, such as when bleeding cannot be stopped or sterile conditions cannot be satisfactorily maintained. No other practice heretofore existed for obtaining living tissue from a tumor.

According to the invention a forceps device for use in conjunction with a sponge device is provided having co-operating short and long jaws adapted to grip said sponge device therebetween with its major portion free on one side and backed-up on its opposite side by the long jaw and with the outer side of the short jaw roughened and adapted to loosen tissue when rubbed thereover.

The sponge device, preferably in a dry condition, is rubbed over the tumor carried by the patient whilst held by the forceps. The tumor may be rubbed with the sponge device with a generally circular motion accompanied by downward pressure. Reciprocatory motion may also be used. The amount of pressure used depends on judgment. Very light pressure might be used if the rubbing time is long enough and the maximum pressure used need not be sufficient to hurt or annoy the patient unduly. Sometimes a sopping or sponging action is sufficient. As a result of this step various small sized pieces of tumor tissue are entrapped or absorbed in the fine interstices, pores or cavities of the sponge device. A blood and serum coagulating agent insufflated in the sponge device in powder form promptly coagulates absorbed blood and serum carried with or actually carrying the tissue into the sponge device. The sponge being sterile, there is little chance for infection since the amount of tissue removed is extremely slight. No incision is made at all.

The sponge device is then immersed in a bottle of formaldehyde. This step may be carried out promptly after the absorbing step and is for the purpose of killing the tissue and hardening its structure. It may be the same type of fixing that is done in the case of an excised specimen.

Thereafter, usually in the laboratory, the remainder of the processing is carried out. The sponge device is immersed in a dehydrating agent which may be alcohol, acetone or the like. Next the sponge device is immersed in heated molten paraffin wax with the side of the sponge device that was rubbed on the tumor down on the bottom of the pan. After cooling the paraffin solidifies into a cake embodying the sponge. This cake may be easily handled by a microtome for slicing, in the same manner that an excised tumor specimen is sliced to produce tissue thin enough for microscopic examination by transmitted light. The usual practice of staining with various stains for developing the tissue structure may be followed after the slice of tissue has been floated on the microscope glass.

The final result is the microscope glass carrying the microtome slice ready for microscopic examination by a pathologist.

It is important to note that all of the foregoing steps in the preparation of histological specimens are familiar to patho-

logists excepting for the fact that instead of using an excised specimen, with its attendant pain and dangers to the patient, a suitable sponge device is simply rubbed firmly on the tumor whilst held by the forceps device and then handled in the manner of an excised specimen.

Various kinds of sponge devices may be used as exemplified by cotton gauze, synthetic rubber sponge, natural sea sponge, blotting and tissue paper sponge, gelatin sponge and cellulose sponges of various pore sizes. Cellulose sponge has the advantage that particles do not break off easily during the rubbing step and no difficulties are introduced during subsequent processing. Cellulose sponge is not soluble in any of the materials customarily used to process an excised specimen and no operational difficulties are introduced during the operation of the microtome. For practical reasons the color of the sponge device should preferable be white since it permits easy visual determination of when the sponge has absorbed or picked up an adequate amount of matter from the tumor.

The cellular structure of the sponge device is easily distinguished from the characteristic appearance of the tissue. A competent pathologist has no material difficulty in examining the tissue entrapped or absorbed in the pores or cavities of the sponge device. It is to be emphasized that the tissue represents living tissue obtained directly from the tumor. Therefore, it has the characteristic appearance of living tissue obtained by excising a specimen from the tumor.

The forceps used as a surgical tissue collector device is illustrated in the accompanying drawings, in which:—

Fig. 1 is a perspective of the tissue collector device;

Fig. 2 is an enlarged top view of the jaws with a broken line outlining the portion of a sponge gripped thereby;

Fig. 3 is a cross section of the short jaw taken from the line 3—3 in Fig. 2, this Fig. 3 being enlarged relative Fig. 2;

Fig. 4 is a side view of the jaws as they appear when in angular relation with the handle portions and thus represents a modification;

Fig. 5 is a perspective showing the further modification involving a suction feature, and

Fig. 6 shows the long jaw of the device of Fig. 5 on an enlarged scale to illustrate its construction in detail.

Referring to Figs. 1 to 3, the tissue collector device may generally follow the construction of surgical forceps by comprising interpivoted handles 1 and 2 having finger loops 3 and ratchet locking parts 4. The handles 1 and 2 are interpivoted at 5 and extend beyond to the jaws. Thus far the device is similar to a surgical forceps.

Now diverging from the prior art the tissue collector device has a short jaw 6 and a long jaw 7, the latter being in the form of a loop arranged in a plane transverse to its swinging direction. These short and long jaws are adapted to grip a sponge device therebetween with its major portion free on one side and backed-up on its opposite side by the long jaw. The manner of holding the sponge device is illustrated by Fig. 4 showing the modified angular relation between the jaws and handles but operating in the fashion of the device illustrated by Figs. 1 to 3. Preferably the sponge engaging face of the long jaw 7 is roughened as shown at 8 so as to restrain relative movement between the sponge device and the long jaw. The inner end of the sponge device is tightly nipped or gripped between the two jaws. The shortness of the short jaw leaves a large amount of the sponge device exposed. Therefore it is easy to use the device to rub the sponge device on the tumor so as to realize the full effectiveness of the sponge device. The long jaw backs-up the sponge so heavy rubbing force may be used if desired.

The roughness on the outer face of the short jaw 6 preferably comprises transverse ridges 9 adjacent its outer end and longitudinally extending ridges 10 leading to the transverse ridges 9. The ridges 9 are preferably interrupted transversely of the jaw so that they are in the form of sections and preferably a multiplicity of rows of the ridges 9 are provided. The longitudinally extending ridges 10 are interrupted longitudinally of the jaw and are also used in multiple rows. The jaw 6 is shown as having a triangular shape so as to match the throat of the loop forming the long jaw 7. The longitudinally extending grooves 10 are arranged in a fanned pattern so as to take full advantage of the triangular shape.

In Fig. 4 the handles 1 and 2 are shown bent at an angle relative the jaws 6 and 7. This has an advantage where it is necessary to use the device through surgical devices making manipulation of the sponge difficult. The handles 1 and 2 may be operated effectively at an angle relative the sponge device gripped by the jaws.

In Fig. 6 the handle 2a and the long jaw 7a are made tubular and the face of the jaw 7a that engages the sponge device is formed with a series of inlets 11. The finger loop of the handle 2a is provided with an outlet 12. The other parts may

be made as already described. The constructions of the handle 2a and jaw 7a are such that there is a continuous passage between the outlet 12 and the jaw 7a. This passage is free from openings excepting for the inlets 11. Therefore suction applied to the outlet 12 tends to remove excess fluid with which the sponge may become saturated and hence enhances the capacity of the sponge device to collect tissue.

In use, the sponge device is clamped between the short and long jaws in the manner indicated by Figs. 2 and 4, the lock 4 being used to maintain the jaws closed. The tissue collector device may be drawn toward the user with the longitudinal ridges 10 lacerating the tumor tissue and the transverse ribs 9 tending to roll the tissue free. When the sponge device reaches the tissue there is considerable loose material thus provided for it to pick up. The sponge device collects the tissue on its surface while absorbing any liquids, the surface of the sponge device functioning somewhat as a screen to prevent the tissue from penetrating too deeply. When the sponge device becomes filled with liquid it loses its absorption properties. If the modification shown by Figs. 5 and 6 is in use, suction may then be applied to remove the liquids with which the sponge device may have become saturated, thus permitting the penetration of more liquid into the sponge device and consequent collection of more tissue on the sponge surface. Suction may be used continuously if desired.

The roughened surface 8 on the face of the long jaw tends to prevent the sponge device from moving relative the long jaw which is backing it up. Considerable pressure may be applied to the sponge device to rub it on a tumor because the long jaw 7 provides its backside with rigid support.

What I claim is:—

1. A forceps device for use with a sponge device for the collection of tissue from a tumor having co-operating short and long jaws adapted to grip said sponge device therebetween with its major portion free on one side and backed-up on its opposite side by the long jaw and with the outer side of the short jaw roughened and adapted to loosen tissue when rubbed thereover.

2. A device according to claim 1, in which said roughened outer side of the short jaw is formed with transverse ridges adjacent its end and with longitudinally extending ridges leading to said transverse ridges.

3. A device according to claim 1 or 2, in which said long jaw is tubular and is provided with inlets to its interior arranged on its sponge-engaging side and an outlet to which suction may be applied.

4. A device according to any of claims 1 to 3, in which said jaws have handle portions with which they are relatively angular.

5. A forceps device substantially as herein described and illustrated in the accompanying drawings.

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697,603 COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

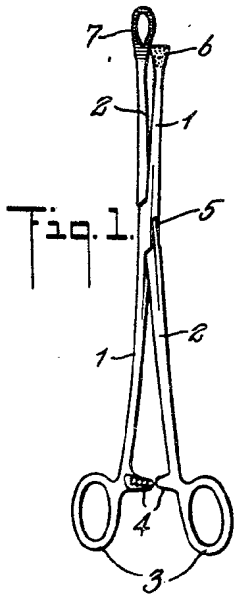

Fig. 1.

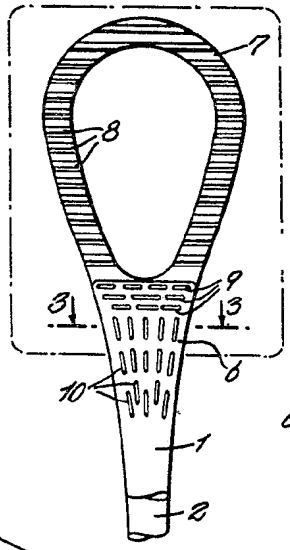

Fig. 2.

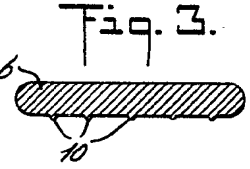

Fig. 3.

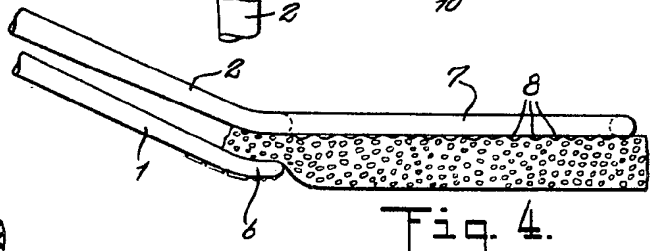

Fig. 4.

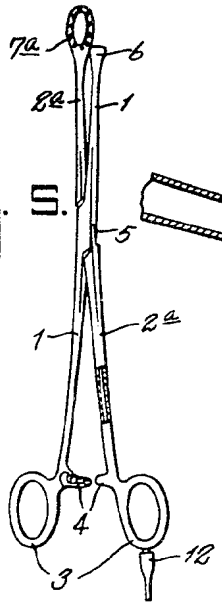

Fig. 5.

Fig. 6.